

Ancient Rapanui Water Management: German Archaeological Investigations in Ava Ranga Uka A Toroke Hau, 2008-2010

Burkhard Vogt and Johannes Moser

*Commission für Archäologie Außereuropäischer Kulturen des Deutschen Archäologischen Instituts
Dürenstr. 35-37, D-53173 Bonn /Germany*

OF ALL RESOURCES REQUIRED BY MAN, fresh water is perhaps the most vital one. Both settled and pastoral societies developed a wide spectrum of strategies for procuring, storing, and distributing fresh water, and they also invented methods to handle the risks of frequent floods. One expression of human ingenuity is the evolution of hydraulic architecture that – from a purely technical point of view – is a favorite research subject of engineers and geographers. The use of wells, cisterns, dams, dikes, and the like, was and is global; technical adaptations have been documented not only in arid zones but also in wetter environmental settings such as Hawai‘i and the Marquesas (see Kirch 2006).

On Easter Island, the use of water on the island has not been well documented by archaeologists. Early European seafarers such as Roggeveen, Cook and La Pérouse did not hesitate to emphasize the poor quality of the island’s drinking water; and more recent scholars studying Rapanui culture only note that precipitation on Easter Island is abundant. Only Sebastián Englert devoted a ten page chapter of his well-known *La Tierra de Hotu Matu‘a* (1948) to traditions related to fresh water, its scarcity during times of drought and its consumption. He provided a valuable list of ancient wells and water cisterns and described the access to drinking water from the alleged main sources in the volcanic craters of Rano Kau, Rano Aroi and Rano Raraku. In more recent times, geoarchaeological field research highlighted run-off as the main agent of erosion, but water has not figured as a determining factor, for example, of calculating the size of the ancient Rapanui population.

The German Archaeological Mission, headed by the German Archaeological Institute, has been working on Easter Island since 2007. The main general objective of the project is to scientifically study the islanders’ access and use of basic

natural resources (water, soil, obsidian) and to contribute to the documentation of the surviving architectural heritage. The research methods employed include both archaeological excavation and state-of-the-art non-invasive techniques of documentation¹ and geophysical prospection². During the four seasons of field work, several sites and monuments were documented and prospected, including re-erected *ahu* and unexcavated sites³. The third portion of the project involves archaeological excavations were devoted to two sites, Ava Ranga Uka A Toroke Hau and the site of Te Peu. They represent different natural and probably chronological settings, the first an inland site, the latter right on the steep cliff of the northwest coast. At Te Peu research has just begun in 2010. Therefore, this article will exclusively focus on the results of the 2008 through 2010 field seasons of excavations at Ava Ranga Uka A Toroke Hau.

ARCHAEOLOGICAL EXCAVATIONS AT AVA RANGA UKA A TOROKE HAU

Ava Ranga Uka A Toroke Hau is situated in the center of the island some 2 km north of Fundo Vaitea (Figure 1). Located on the southern slope of Maunga Terevaka at an elevation of about 270m above sea level, the site is above the ordinary zone of ancient Rapanui agriculture (cf. Ladefoged et al. 2010:82; fig. 1). It benefits from high precipitation that has been recorded from the summit of Terevaka. A dense cover of grassy vegetation obscured most of the archaeological remains when Sonia Haoa introduced us to the site in February 2007. Most run-off from Terevaka is collected in the Rano Aroi crater lake from where the Quebrada Vaipu (Vaipu gully) takes its course down to the vicinity of Akahanga on the south coast. There is good reason to assume that the gully contained – until quite recently – a perennial creek, perhaps the only one on Easter Island. The site of Ava

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¹ During four field seasons the Department of Geomatics of the Hafen City University, Hamburg, under the direction of Thomas Kersten carried out a detailed and non-contact 3D documentation of different *ahu* and *moai*, and archaeological excavation sites by Terrestrial Laser Scanning and photogrammetry, a geodetic field survey to establish geodetic networks at scanning and excavation sites, and GPS measurements for the transformation of laser scanning data into the UTM coordinate system. This work has been published in several papers (see for example Kersten et al. 2009).

² The geophysical study was carried out by Jörg Fassbinder from the Bavarian State Department of Monuments and Sites. After the pioneering work of Lipo et al. (2005) geomagnetic prospecting was applied for the second time on the island. It proved more suitable than geoelectric prospecting. Several papers have appeared already (for further references see Fassbinder et al. 2009).

³ The first season in 2007 was devoted to the search of future excavation sites and to monument documentation and prospecting. Since then the following sites were studied: Te Peu (G; archaeological test sounding), Hanga Tee (G), Ava Ranga Uka A Toroke Hau (G, S, excavation), Hanga Hemu (G, S), Tongariki (S), Ahu Nau Nau and Ahu Ature Huki at Anakena (G, S), the *moai* of Vaihu (S), Ahu Akivi (G, S), Ahu Vai Uri (S), Ahu Tahai (S), Ko Te Riku (G, S), Akahanga (G, S), Ahu Akapu at Hanga Kioe (S), modern quarry of Maunga Orito (S), Miro O One (S), Ahu Riata (S), Ahu Tautira (S). ‘G’ stands for geophysical prospecting, ‘S’ for laser scanning.

Ranga Uka A Toroke Hau can be divided into a larger western part with traces of a small settlement, and an eastern portion with a small image *ahu*, Ahu Hanua Nua Mea as the most prominent “landmark”.

At the site a narrow gully widens into a small natural basin of some 80m length and 50m in maximum width. Sonia Haoa drew our attention to the remains of a large stone-lined terrace that may have functioned as a dam, which had once been built across the gully, and to a short alignment of four smoothly-finished basalt slabs equally visible in the riverbed. The narrow gully immediately downhill showed traces of another stone-lined terrace 40m below the first one. Changing seasonal vegetation and an increasing acquaintance with the terrain soon revealed further archaeological features such as walls along the creek, terrace walls, three or four tiny caves in the escarpment, and most prominently and enigmatically, several patches of cobblestone pavement on the slopes. It is clear that the entire natural basin had somehow been anthropogenically transformed and that the features were related to the use of water. The remains of the two stone-lined terraces suggested the former presence of dams or weirs that would have completely crossed the gulch. The Ahu Hanua Nua Mea and the sporadic occurrence of *paenga* stones in the basin and in the settlement area indicated some sort of control that the Rapanui elite may have exerted over Ava Ranga Uka A Toroke Hau.

From 2008 to 2010, several excavation trenches were dug. Here, we focus on the stone-lined basin T 01, the excavations across the remains of dam R 01, trench T 04 cutting through the entire width of the small gulch, and the excavations inside and in front of cave C 01 (see Figure 2)⁴.

STONE-LINED BASIN T 01

The four basalt slabs, the top of which emerged from the floor of the gully, turned out to be part of a rectangular megalithic structure of 5m by 2.75m (Figures 3). The monument is cut into the western slope of the riverbed; its maximum original depth was about 1.5m. Its masonry consists of basalt slabs which, in the lower part, are carefully set on edge, with up to two layers



Figure 1. The natural basin of the Quebrada Vaipu at Ava Ranga Uka A Toroke Hau with the Ahu Hanua Nua Mea in the foreground. Photo: B. Vogt.

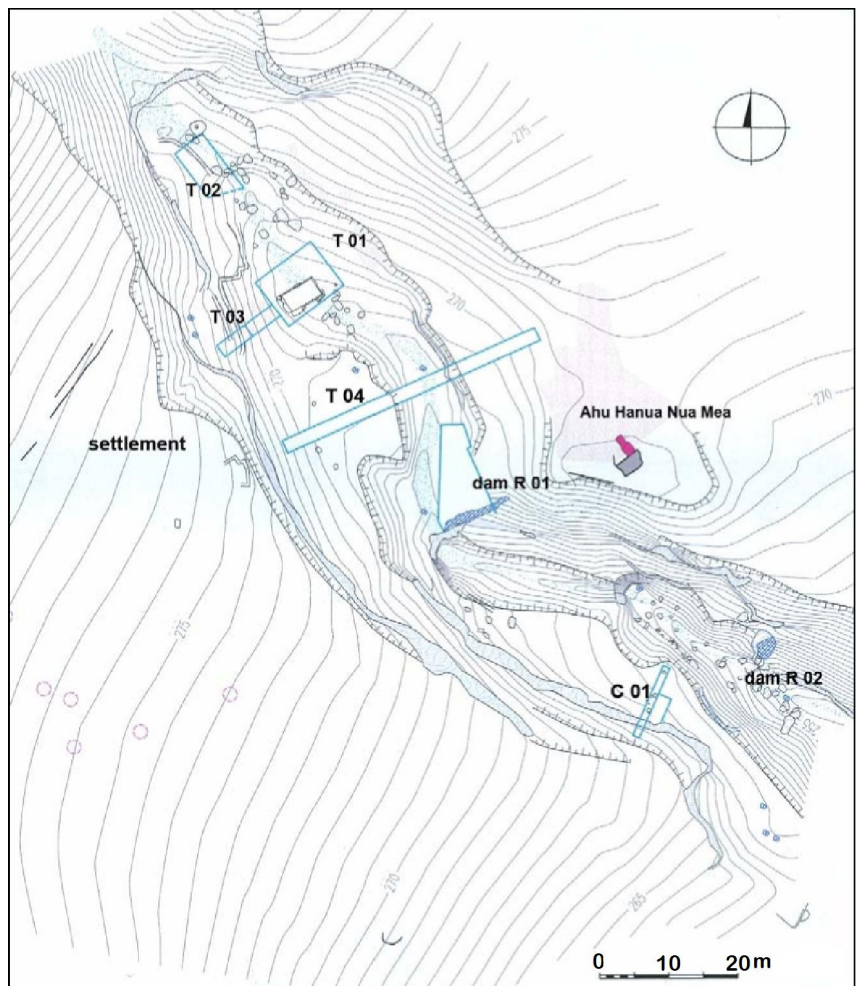


Figure 2: Plan of Ava Ranga Uka A Toroke Hau with location of the different excavation trenches, by C. Hartl-Reiter.

⁴A more detailed and illustrated report has been submitted for publication (Vogt & Moser, in press).

of horizontally laid meticulously dressed stones or ashlars above. The largest among the orthostates (upright set stones) is a slab of more than 2m in length with a height of 0.9m. Although one of the ashlars shows two small circular holes indicating a secondarily used *paenga* stone, the bulk of stones appear to have been cut for this particular construction. We believe the structure was a water tank or basin because of its location in the riverbed. This interpretation is confirmed by the presence of a box-like annex on the exterior of the basin's east corner, which would have served as an inlet from the creek into the tank.

Major portions of the structure are built directly on the smoothly eroded bedrock, which slopes markedly southward to more than 50cm below the lower edge of the southern wall. This slope explains why a pavement of flat medium-sized boulders was laid out in the southern portion of the basin to level the irregular rock surface. The pavement continues as a foundation underneath the orthostates in the south suggesting that both the basin walls and the pavement were built at the same time. The northern half of the rock floor shows traces of three petroglyphs, the drawing of a human footprint, a stylized double canoe, and a sea creature that may be interpreted alternatively as a fish, a dolphin or a crustacean.

The basin's hydraulic function is also suggested by the



Figure 3. Stone-lined basin T 01 at the end of excavation. Note the external annex on the left and both the stone pavement and the bedrock in the interior. Photo: B. Vogt.

stratigraphic sequence of its fill. The upper fill consisted primarily of colluvial material washed in within a short period of time from the slopes of the gully. It was composed of rounded boulders of different size embedded in a matrix of compact earth and gravel. Several lithic objects were collected from this upper fill, but it is clear that this was not a primary cultural deposit. There is, however, a marked change in the stratigraphic deposition just above the rock floor and the pavement: the lower 20cm of the sequence consisted of a layer of red sand, apparently with a high iron content and originating from disintegrated volcanic rock. It superimposed a deposit of dark grey mud containing a high amount of decomposed organic material.

The fill under several layers of slabs yielded a micro-stratigraphy of very compact layers of coarse red volcanic sand, dark grey mud with a very high content of organic matter in an ongoing state of decomposition and layers of very fine whitish clay originating from volcanic ash. All layers contained hundreds of waterworn pebbles (*poro*), which are typical of the island's coastal waters.

Sandwiched in between were more than one thousand lithic artifacts, mostly of obsidian, as well as an almost insignificant number of basalt artifacts. The majority of the artifacts recovered were débitage comprised of flakes, chips and debris. The excavation also yielded a great number artifacts and a preliminary analysis of the lithic inventory shows that the range is wide. The modified tools are a hammer-stone made from a pebble, laterally retouched flakes and blades, end-scrapers, side-scrapers, splintered pieces, notched pieces, borers, tanged pieces, (only from above the pavement), unifacially retouched pieces, grinded and polished stone knives as well as adzes (*toki*) of different types. The adzes were made of obsidian and basalt. Those made from obsidian are unifacially retouched;

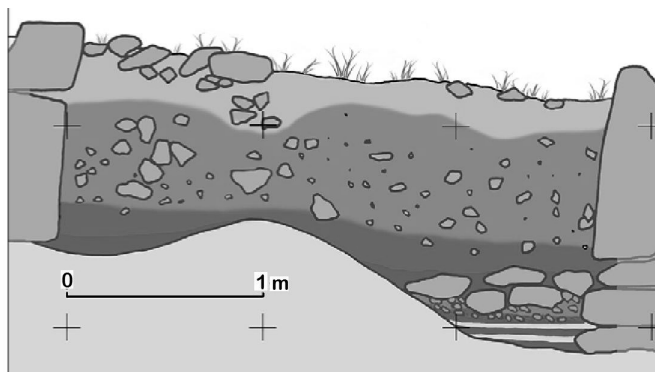


Figure 4. Cross-section of stone-lined basin T 01 drawn by M. Huckle, M. Vogt, and B. Vogt.

the basalt adzes on the other hand were produced by uni- and bifacial retouching and finished by grinding and polishing. All adzes bear signs of heavy use. Edge damages and efforts of re-sharpening could be observed repeatedly. One of the basalt adzes was made from a large flake and produced by unifacial retouching. The fact that some tools and flakes bear remains of the cortex support our assumption that the raw material was brought to the site for a production on the spot or nearby.

A first analysis of the lithic inventory shows that the spectrum of artifact-types is wide. The modified tools are a hammer-stone made from a pebble, laterally retouched flakes and blades, end-scrapers, side-scrapers, splintered pieces, notched pieces, borers, tanged pieces (only from above the pavement), unifacially retouched pieces, ground and polished stone-knives as well as adzes (*toki*) of different types, the latter partially miniaturized. The already mentioned a hammerstone with battering marks on its two poles providing evidence that a so-called direct hard percussion technique was used to strike off the flakes and blades.

In addition to the lithics, the finds from underneath the pavement of the stone-lined basin include three animal bones (two crab claws and a fish vertebra), a bead made from a nut-shell and three wooden awls – to our knowledge the only ones ever collected from an excavation on the island. The bulk of finds unexpectedly encompassed botanic remains such as more than 200 fragments of nutshells (*Jubaea* palm) with only few traces of rat gnawing, more than a hundred seed stones of gourd, branches and even leaves of trees, all of which make this a most uncommon palaeobotanical collection⁵. Obviously, the reason for its excellent preservation is its moist and humid environment in a very dense, clay-sealed matrix. Judging by its context, all these finds originate clearly from a primary context that may incorporate the deliberate deposition of the artifacts and macro-flora. This cache and the representative appearance of the basin as well as the fact that the floor of the basin bears three petroglyphs, suggest a possible ritual use hitherto unknown on Easter Island.

The stratigraphic layers directly above and below the pavement were sampled for AMS dating. Four samples – two nutshells, one charcoal fragment, and one soil sample with botanical remains – were submitted to the Radiocarbon Dating Laboratory at the University of Erlangen, Germany (see Table 1). Samples Erl. 13247 and Erl. 13250 originate from the fill above the pavement, samples Erl. 13248 and Erl. 13249 were taken from underneath the pavement. From a stratigraphic point of view, the samples provide a *terminus post quem non*, or an estimation for the latest date for the construction of the basin and its pavement. Bearing in mind the proposed extinction of the island's *Jubaea* palm populations by roughly 1500, we consequently expected the basin to pre-date 1500. The corrected AMS readings, however, provide a different picture (Table 1.).

As expected, the two stratigraphic contexts date more or less to the same time period, also implying that the stone basin was possibly not in use for a longer period. All calibrated dates relate the construction to the 16th century or perhaps even to the early 17th century. Consequently, this would suggest that palm populations still existed nearby. This late date coincides well with another late date published by Mieth & Bork (2004: 285) for the eastern part of Poike Peninsula.

DAM R01 AND ITS RESERVOIR

About 40m downhill from stone-lined basin T 01, the most monumental architectural structure at Ava Ranga Uka A Toroke Hau, dam R 01, was constructed. The dam's central part is missing and was likely destroyed by an extraordinary flood event (Figure 5). Excavation efforts in 2009 therefore focused on its better accessible eastern end.

R 01 is a simple earth dam built directly on bedrock. It consists of an outer (downhill) stone facing of large to medium-sized boulders and a fill of smaller pebbles and earth originating from the riverbed. The facing as well as the section created by the last dam break show three phases of construction. These are apparently associated with the successive siltation of the reservoir, which clearly confronted the Rapanui builders with major problems. In its final phase, reservoir sediments reached the summit of the dam, thus reducing the reservoir's retaining capacity to almost nil and eventually caused the possibility of several breaks.

The adjacent section through the reservoir fill yielded a comprehensive sequence of washed-in sediments alternating with anthropogenic interference: The most conspicuous feature is comprised of four superimposed cobble and random stone pavements (Figure 6) which vary strongly in quality of

Table 1. Calibrated AMS readings from four samples from stone-lined basin T 01 at Ava Ranga Uka A Toroke Hau.

lab. #	years BP	δC13	corrected cal. 1σ	corrected cal. 2σ	remarks
Erl-13247	384 ± 40	-27.4	AD 1479 – 1512 20.2%	AD 1458 – 1631 95.4%	soil with organic remains
			AD 1544 – 1623 48.1%		
Erl-13248	360 ± 39	-23.4	AD 1502 – 1592 58.2%	AD 1463 – 1469 1.5%	nutshell; under pavement
			AD 1613 – 1629 10.1%	AD 1476 – 1642 93.9%	
Erl-13249	307 ± 39	-22.8	AD 1509 – 1575 38.7%	AD 1497 – 1601 50.5%	nutshell; under pavement
			AD 1620 – 1657 29.6%	AD 1607 – 1672 38.6%	
				AD 1743 – 1756 1.7%	
				AD 1761 – 1770 1.1%	
				AD 1779 – 1796 3.5%	
Erl-13250	349 ± 40	-24.9	AD 1504 – 1588 56.1%	AD 1464 – 1468 0.7%	charcoal; from SW corner
			AD 1616 – 1635 12.1%	AD 1477 – 1647 94.7%	

⁵ The collection is presently under study by Catherine Orliac, Paris.

execution. From a technical and functional point of view, their installation inside the reservoir is unnecessary.

In several places larger air holes were recorded between the pavement stones indicating that they were buried very quickly under thick gravelly mud flows rather than under more liquid, successively accumulating sediments. These substantial deposits may represent events of short duration such as violent although limited downpours, while two thinner layers of markedly finer yellowish sediments may suggest the effects of longer dry periods with only little precipitation. Altogether the sediments rose to a height that ultimately also buried the above stone basin T 01 and left behind an almost horizontally filled reservoir as it can still be seen below the plaza of the Ahu Hanua Nua Mea as well as in the central part of the gully. For reasons yet unknown, the Rapanui builders apparently refrained from cleaning the reservoir of accumulating sediments. Instead they laid out the pavements and simultaneously raised the dam from originally little more than 1.5m to a final height of about 3m.

It should also be noted that no outlet or spillway has been detected. Nor did mapping of the area immediately below dam R 01 produce any evidence for a channel that could have diverted water from the reservoir into nearby fields or gardens (nor does the lower dam R 02). It seems therefore quite unlikely that dam R 01 was ever used for irrigation.

Little can be said at present about the absolute dating of the dam. Many charcoal samples have been recovered from the core of the earth dam as well as from almost all layers of the reservoir fill. Excavation also brought together a substantial collection of obsidian artifacts, among these tanged types (*mata'a*) diagnostic of the later phases of Rapanui culture (Heyerdahl and Ferdon 1961). Their presence is, however, probably due to alluvial transport. Their chronological implication is therefore limited. Another interesting find was the presence of nearly forty coral fragments in the sediments just behind the dam. Usually encountered near *ahu* platforms or inside fireplaces, corals may represent a kind of sacrificial offering which may refer to a water cult or – more precisely – to the worship of the rain god Hiro. Métraux (1957 :110) refers to cult practices in times of drought when the *ariki's* priest prays for rain and buries wet seaweed and corals in the hills. Water rituals have not yet been archaeologically attested to on the island, although a fertility cult has been reported for the site of Puohiro on the northeast coast (ibid. 1940: 310).



Figure 5. Ava Ranga Uka A Toroke Hau, Dam R 01 below the Ahu Hanua Nua Mea, at the end of excavation. Photo: B. Vogt.

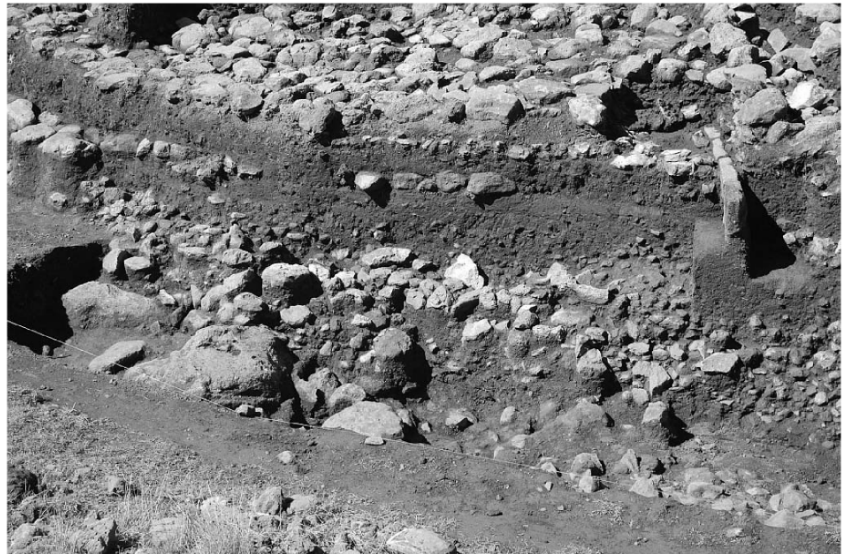


Figure 6. Detail of the stratigraphic section through the reservoir sediments behind Dam R 01. Photo: B. Vogt.

TRENCH T 04

Clearing vegetation from the slopes of the gully revealed several patches of pavement which evidently coincide with those recorded from the archaeological excavations at the dam. Even if the slopes of the small natural basin are now buried under debris that was washed in since the abandonment of the site, there can be no doubt that pavements once covered the entire area. The amount of energy, material and labor must have been enormous and cannot be explained with purely functional criteria or with counteracting the increasing erosion. To study this total landscape transformation in more detail, the expedition began digging trench T 04 in 2010 (Figure 7) This trench cuts across the entire basin and the reservoir fill starting from the more elevated settlement area in the west and ending at

the edge of the plaza of Ahu Hanua Nua Mea in the east. With 44m length and a width of 2m, it is the largest continuous excavation effort at Ava Ranga Uka A Toroke Hau thus far. It produced many interesting archaeological features of which we present here only a selection.

At the western end of trench T 04 in an area where more terrace walls were expected, excavation unveiled another patch of stone paving (Figure 7, right). Uncovered in an area where the talus of the western escarpment passes into the almost horizontal fill of the reservoir, this pavement is identical in location and construction technique to segments superficially visible uphill of stone-lined basin T 01 and the topmost pavement just behind (upstream) dam R 01.

The central section of T 04 shows a sequence of horizontal layers as was expected within the reservoir area. While the lower part of the sequence – excavation has not yet been terminated here – displays strata of angular gravel and small stones, a substantial greyish layer just above these colluvial sediments contains several fireplaces with a high amount of ash and charcoal fragments. Apparently, at least during its terminal occupation, the reservoir area was used for purposes not directly related to the use of water.

The central part of the dam was destroyed by an extraordinary event. Currently the erosion gully provides insights into the stratigraphy of the small valley (Figure 8) confirming and supplementing earlier findings recorded upstream of dam R 01. In this zone, the excavation has almost reached bedrock above which many very large river boulders signal a naturally accumulated substratum of at least 1 m depth. Above that substratum are anthropogenic layers related to the use of the reservoir of dam R 01. They consist of three pavements made from small to medium-sized, loosely packed slabs and random stones. The pavements are identical to those traced in 2009 on the inside of dam R 01 (cf. Figure 6 top) and in the western part of trench T 04 which was excavated in 2010 (Figure 7 right). Again, these pavements differ in quality of construction with the uppermost one being laid out more carefully.

Additionally, and separated by deposits of coarse and angular gravel, the section displays three, perhaps four, relatively thin layers of finer, bright-colored sediment. These deposits seem to have accumulated over longer periods of time each – possibly during seasons with low amounts of precipitation. These finer sediments are present above a pavement, one just below it, as well as immediately upon a pavement. Similar sediments are known to the authors from ancient irrigation systems and agricultural contexts in the Middle East desert zone (cf. Vogt 2004). It is possible that the deposits were used for wet taro, as the authors have seen similar deposits in French Polynesia, especially on Nuku Hiva. The occurrence of a pavement at Ava Ranga Uka A Toroke Hau directly above such silts, however, is puzzling and marks a clear difference.



Figure 7. Trench T04 during excavation from W to E (left) and the western end of the trench (right). Photos: B. Vogt.

Complementing the findings from the other trenches at Ava Ranga Uka A Toroke Hau, trench T 04 may have further implications for future geo-archaeological research on Easter Island. In an environment where erosion has been extremely strong and soils often diminished, dramatically exposing rock surfaces, T 04 yielded a section through the small gulch with a depth of almost 6m – to our knowledge the most comprehensive archaeological stratigraphy on the island. It figures as a geo-archive, which reflects a history of intensive land use by the ancient Rapanui over a period of possibly several hundred years.

CAVE C 01

Leaving the small natural basin with the reservoir of R 01 and following the creek downstream, the gully passes into a short narrow gulch with steep slopes. Despite the difficulty of the terrain, relief dam R 02 was built here at a distance of about 40m from R 01 (cf. Figure 2). It forms another, though much smaller, reservoir that is completely filled with sediments. Dam R 02 is broken as well and the flood event has deeply cut into its reservoir sediments. The dam's scant remains on the eastern bank, along with a few other stone structures that have been documented here, have not been studied yet except for cave C 01.

Cave C 01 belongs to a series of small caves that dot the low escarpment on the right bank of the creek. It lies almost opposite the remains of dam R 02 (Figure 9). The morphology and the inclination of the terrain may have allowed the construction of a channel from the upper dam R 01, i.e., a channel crossing the reservoir area of R 02 and passing by along the southwest escarpment. That would have been an unlikely configuration if the two dams had operated at the same time. Negative evidence in this matter would also restrict the alter-

native explanations for the function that one may conceive for the upper dam R 01. Consequently, we wanted to find out whether the cave was occupied before, during, or after the operation of dam R 02. For that reason, an excavation of 12m long by a maximum of 3m wide was laid out from the rear wall of the cave through the entrance and expanded on the exterior to the steep slope of the gully.

The entrance of the cave, situated slightly above the reservoir sediments and oriented to the north is approximately 1.5m wide and about 0.9m high. The interior is 2.5m deep and 3.5m wide, thus offering a space of some 8 square meters for a maximum of 3-5 persons. The ceiling is 1.3m above the recent floor. It appears that in places minor efforts were undertaken to artificially enlarge the cave by cutting the walls around the threshold. The latter is additionally furnished with the remains of a wall that – compared to other caves on the island – may have been used to block and to protect the entrance.

The cave was filled with sediment, the surface of which was covered with a great number of scattered sheep bones. Prior to 2010, about one half of the cultural deposits were excavated down to bedrock. It was altogether poor in finds and findings, among the latter a fireplace on top of bedrock. The presence of few artifacts and manuports suggests temporary occupation that was not intensive. Beside modified pebbles, obsidian tools and blanks, two ovoid basalt cobbles were unearthed which may have served as stone pillows (*turua, ngaru'a*). Quite common at Rapanui habitations sites, these 'pillows' often bear petroglyphs (Esen-Barr 1989: 293; Heyerdahl & Ferdon 1961:450), but petroglyphs were not present on the two examples from the cave. These artifacts do not appear to have been the result of washed-in deposition. Organic artifacts such as bone tools or wooden tools were not recovered.

As expected, the trench in front of the cave yielded more comprehensive and conclusive information. Most importantly, its stratigraphic section displays a sequence of three distinguishable cultural layers. They derive from an occupation which appears to postdate the use of the area as a reservoir. Several stone structures were identified (Figure 10): immediately in front of the entrance the segments of two stone alignments were unearthed. Together they perhaps show the contours of a core-filled wall with a filling of earth, random stones, and gravel. During an earlier phase of occupation such a wall could have served as a platform for domestic activities. Almost parallel to it another wall was discovered. Its function and further extension still being unknown; it is built from quarry stones and boulders set in two layers. An almost circular stone structure, open to the north and belonging to the context of level 3, could be identified by its high content of charcoal as a stone-lined hearth (*umu pae*).



Figure 8. Section in the erosion gully with three pavements, gravel and finer sediments. Photo: B. Vogt.

The inventory of exclusively lithic artifacts from this trench is quite rich. It is composed of obsidian artifacts and (very rarely) tools made from basalt. The obsidian can be categorized in three different varieties of raw material, perhaps representing the known main sources at Maunga Orito, Rano Kau, and Motu Nui (Baker et al. 1974: 3, fig. 1). In addition to débitage with flakes, blades, chips and debris, the excavation also yielded a number of modified tools and nuclei of different types such as unipolar retouched blade cores (from level 3), discoid nuclei with centripetal retouching, or multi-directionally exploited nuclei.

This, and the observation that some tools and flakes bear traces of the cortex, supports our assumption that the imple-

ments were produced on site. Preliminary analysis shows a wide spectrum of artifact types. The modified tools are laterally retouched flakes and blades, flakes and blades with very fine retouching caused by use; side-scraper-like retouched pieces, splintered pieces, notched and denticulated pieces, a borer-like tool and tanged pieces of different types. Four different types of adzes (*toki*) made from obsidian and basalt, respectively, supplement this collection.

Almost all flakes and blades contain a plane striking platform or a platform which bears remains of a cortex. Some flakes and blades contain, at their proximal end, signs of a dorsal reduction. Since the numerous carbon samples have not been processed yet, several tanged pieces – one from inside the cave, though all from the uppermost level 1 – make us assume that the occupation of cave C 01 and its exterior ended during the late period of Rapa Nui prehistory. It appears to coincide with the intensive domestic use of the reservoir area of dam R 01 where hearths and scattered ashes dominate the top layer of the section of trench T 04.

CONCLUSION

Based on the findings from the different excavations at Ava Ranga Uka A Toroke Hau, we advocate that the central part of the site in particular might have been more than just an assemblage of hydraulic monuments. The effort and energy invested in the execution of stone-lined basin T 01, its cache and petroglyphs, the finds of coral from the reservoir of R 01, the nearby Ahu Hanua Nua Mea, and especially the ubiquitous stone pavements that cover the slopes of the gully attest to the outstanding significance of the site, which may contain a major ceremonial component. It may have made Ava Ranga Uka A Toroke Hau a kind of sacred landscape which was obscured by domestic occupation only during the *matato* 'a period.

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Figure 9. Trench in front of cave C 01 during excavation, 2010. Photo: J. Moser..

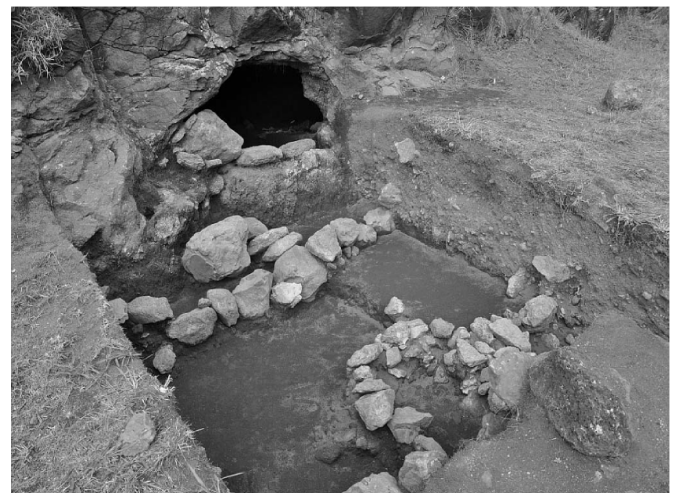


Figure 10. Core-filled wall in front of cave entrance and circular hearth. Photo: B. Vogt.

Hamburg (photogrammetry: 1-4); Annette Kühlem, Bonn (archaeologist: 4); Maren Lindstaedt, Hamburg (Terrestrial Laser Scanning: 1); Merahi López Atam, Isla de Pascua (student of archaeology: 2); Sergio López Atam, Isla de Pascua (survey assistant: 3); Klaus Mechelke, Hamburg (Terrestrial Laser Scanning: 2-3); Johannes Moser, Bonn (prehistorian and deputy director: 1-4); Susana Nahoe, Isla de Pascua (representative of CONAF: 3-4); Francisca Pakomio

Villanueva, Isla de Pascua (student of archaeology: 4); Nikolaus Schlüter, Berlin (excavation technician: 2, 4); Kristin Schreyer, Hamburg (surveying assistant: 4); Alexander Sedov, Moscow/Russia (archaeologist: 2); Joaquin Soler Hotu, Isla de Pascua (student of archaeology: 3-4); Burkhard Vogt, Bonn (archaeologist and project director: 1-4); Miriam Vogt, Stuttgart (student of architecture: 2-3); Kay Zabel, Hamburg (student of geomatics: 2).

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Author contact information: vogt@kaak.dainst.de;
moser@kaak.dainst.de

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Figure 11. Obsidian tools including tanged pieces (*mata'a*) from outside cave C 01. Photo: J. Moser.